

**STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION
AND DEVELOPMENT COMMISSION**

In the matter of:)	
)	
Exploring Revisions to Current)	Docket 99-DIST-GEN(2)
Interconnection Rules Between)	ORDER INSTITUTING
Investor-Owned and Publicly-Owned)	INVESTIGATION
Utility Distribution Companies and)	Order No. 99-1103-11
Distributed Generators)	
)	
Streamlined CEQA Review Process for)	
Siting Distributed Generation Facilities)	
_____)	

**PACIFIC GAS AND ELECTRIC COMPANY S RESPONSE TO QUESTIONS
FOR THE SITING COMMITTEE WORKSHOP ON
INTERCONNECTION RULES**

Pursuant to the November 10, 1999 Notice of Siting Committee on Distributed Generation Interconnection Rules, (Notice) Pacific Gas and Electric Company (PG&E) files these responses to the questions regarding distributed generation (DG) interconnection issues attached by the Siting Committee (Committee) to the Notice. PG&E commends the Committee for producing a comprehensive and detailed list of many of the key issues to be addressed in the workshop.

Given the breadth of the list of questions, however, and the short time given to respond to the Notice, PG&E has not been able to provide responses in the depth it would have liked. In some instances, the lack of detailed response is due to the fact that PG&E has not yet developed a position on the issue. These responses should be viewed as preliminary and where responses lack detail, the Committee or the workshop participants should not assume that PG&E has no interest in the issue. PG&E looks

forward to participating in the Siting Committee's interconnection workshop and to addressing and resolving these DG interconnection issues.

I. Scope of technologies to be considered for standard interconnection rules

A. What size range of generating technologies should be applicable to the interconnection rules being considered in this proceeding?

PG&E: The California Public Utilities Commission's (CPUC) Decision (D.) 99-10-065 references a 20 MW cap, and recommends that workshop participants address the issue of generator size limitations. PG&E recommends that the workshops focus on DG unit sizes that would be likely to connect to the distribution system, usually 10 MW or less. Going above 10 MW also raises potential California Independent System Operator (ISO) control and dispatch issues. Indeed, 10 MW should be considered a maximum and the group should seriously consider an even lower DG unit size cut-off. The interconnection standards being developed in New York and Texas are for DG units 300 kVA and 10MW and below, respectively. Furthermore, the Institute of Electrical and Electronic Engineers (IEEE) standards expected in 2001 will focus on 10 MW and below (see response to II.C below).

B. Should interconnection rules differ based on size range and technology? If so, how?

PG&E: Yes, interconnection rules should vary based on both size and technology. The IEEE recognized the importance of segregating interconnection rules by size in IEEE 929 which addresses interconnection requirements for photovoltaic (PV) units under 10 kW. The technology issue is also relevant as inverter-based technologies behave very differently on the distribution system than rotating equipment-based technologies.

Interconnection requirements must also allow utilities to address situations where the *location* of DG units on a distribution circuit affects the circuit reliability or power quality for customers served on the circuit (i.e., location can affect design criteria as it relates to voltage regulation, voltage flicker, fault current, etc.)

C. Should electricity storage technologies be considered also? If so, what types should be considered?

PG&E: Requirements relating to electric storage technologies (i.e., batteries, flywheel-based technologies) should be incorporated into the interconnection standard development to the extent that these devices have the potential to backfeed onto the distribution system.

D. Should the standards be independent of the mode of operation? In other words, should the same standards apply whether the intended function is for emergency or back-up use only versus primary use? Should any standards apply to an islanded mode?

PG&E: It is possible that standards can vary depending on the mode of operation. However, the important issue is not what the generator is used for (i.e., backup versus primary load) but rather whether the DG unit has the potential for inappropriately backfeeding onto the distribution system. Standards should also be adopted that apply to DG units that operate in an islanded mode, i.e. islanding of parts of the distribution system due to unintentional circuit interruption. If the term islanded mode in this question means DG not connected to the utility distribution system at all, the interconnection standards would not apply.

E. Should the same standards apply to new installations versus retrofit of existing self-generators or emergency generators?

PG&E: Existing generators installed in accordance with utility interconnection standards will likely have sufficient safety mechanisms to negate the need to retrofit. However, this would only be true for those generators that the utility knows are on the system, and where the DG owner has complied with the utility's interconnection standards. It is possible that generators are in a position to connect to the distribution system without utility knowledge. These situations pose potential safety concerns to utility workers and the public. Per PG&E's Rule 21 requirements, all DG owners should continue to provide the utility with basic information on their connected generators (i.e., size, make, model, location, average hours of annualized usage). If DG owners have not previously reported the DG units to the utility, they should be required to do so.

1. What options should end-users have in terms of choice of interconnection voltage levels, and what are the consequences of these choices?

PG&E: As a general rule, DG owners should have the option of designating the voltage level they wish to interconnect to, as long as

they are willing to pay all costs associated with interconnection at the desired voltage level. This principle also applies to situations where the candidate utility circuit is constrained in terms of the amount of DG already connected. In such cases, the DG owner would be expected to pay not only for the more detailed circuit-specific interconnection study, but also for the increased infrastructure protection equipment. However, the utility should retain discretion to impose interconnection requirements, including voltage level, based on technical review of the proposed interconnection and consideration of the operational impacts. These requirements may be different from the DG owner's preferences.

2. *Are there utility-specific conditions that preclude the application of a single standard?*

PG&E: Yes. While the participants should strive for a single standard, the complexity and differences between the utilities will make it difficult to achieve this goal. Each utility designs its distribution system differently. Additionally, even within the same utility, there are differences between circuits. For instance, PG&E has primary circuit voltages of 4, 12, 17, 21 and 34.5kV. Some distribution circuits are three-wire, others are four-wire. Some single phase taplines are one-wire, others are two-wire, etc.

3. *The CPUC OIR excludes interconnection rules to the transmission side. Is there any need to revisit this decision? Can it be applied without exceptions?*

PG&E: The technical complexity of interconnecting generation at the transmission level would only exacerbate the challenges faced in addressing interconnection at the distribution level. Therefore, the scope of the DG OII should not be expanded to include transmission.

II. Need for California standards and replacement by national standards

A. Which states have made similar efforts to develop interconnection standards? What is the scope of these efforts? To what extent can the work of other states (e.g., Texas and New York) serve as useful starting points for this effort?

PG&E: The most commonly referenced states that have moved ahead on interconnection standards are Texas and New York. In PG&E's opinion, the scope of standard-setting in Texas (units 10 MW and less) and New York (units 300 kVA and less) seems considerably narrower than the scope of this OIR. In addition, these states' standardization processes have not been concluded after a year and apparently some ratemaking issues are still to be addressed. While California would be wise to review the progress made in these two states, any transplanting of positions must be measured against the California's specific situation, rather than adopted in lockstep. For more information on the Texas and New York initiatives, consult the following respective websites:

Texas: www.puc.state.tx.us/rules/rulemake/21220/21220.cfm

New York: www.dps.state.ny.us/distgen.htm#about

B. What efforts have been made within the state to develop a California consensus on interconnection standards?

PG&E: To PG&E's knowledge, no formal efforts have been undertaken in California to develop a state-wide consensus on DG interconnection standards. The CPUC DG OIR proceeding represents the first formal effort for moving towards a state-wide consensus. However, that is not to say that utilities and other parties have not previously communicated or worked together on interconnection standards. For instance, PG&E notes the efforts of the California Alliance for Distributed Energy Resources, and PG&E has sponsored a short series of Rule 21 revision workshops with DG vendors and other interested parties. These efforts have identified common ground which might be useful in developing DG interconnection standards for California.

C. What is the scope and timing of the IEEE P1547 Distributed Resources Interconnection Standard Working Group?

PG&E: The IEEE P1547 working group is expected to complete its work by late Year 2000, with interconnection standards, for units below 10 MW, being issued by early 2001. The standards are expected to cover general interconnection requirements and type testing procedures, similar to those contained in IEEE 929 and its companion standard UL 1741.

D. To what extent do California utilities, manufacturers, and other interested parties participate in the IEEE P1547 Working Group process? How would the development of interim standards in California affect the

progress of the IEEE P1547 effort and its representation by California entities?

PG&E: PG&E actively participates in the IEEE P1547 proceedings via the direct involvement of PG&E staff. Southern California Edison (SCE), other utilities, DG manufacturers, and governmental entities (among others) are also involved. For a more complete listing on who is participating, the Commission may want to contact the National Renewable Energy Laboratory's Tom Basso, Secretary for the IEEE P1547 working group, to request a participant list. As for the impact of the Texas, New York, and California interim standards on the IEEE P1547 developmental process, it really depends on the scope and commonality among the respective states' initiatives, but they will likely influence IEEE P1547 to some extent.

E. Can interim standards developed in California be considered effectively in the IEEE P1547 effort?

PG&E: The answer depends on the scope and focus of the standards. The California Energy Commission (CEC) and CPUC should focus on and recommend proposed standards that are consistent, where feasible, with the IEEE P1547 interconnection standards development. Doing so will help produce broad-based collaborative agreements that can be implemented by utilities and incorporated into equipment manufacturers' designs for all U.S. markets.

F. How would interim standards be adopted and enforced in California? Should they apply to public utilities as well as the CPUC-regulated utilities?

PG&E: As with the current interconnection requirements, any California standards would be adopted via CPUC order and tariff changes (advice letters). In order to provide equal footing for both DG and distribution utilities throughout California, these standards should apply to all public agency utilities (e.g., municipalities, special districts, and irrigation districts that provide electric services) as well as CPUC-regulated utilities.

G. What are the mechanics for replacing interim California standards with national standards (i.e., IEEE P1547)?

PG&E: After the completion and acceptance of the IEEE national standards by the US Department Of Energy, all workshop participants

should reconvene and discuss the applicability of IEEE standards to the ones adopted as a result of this proceeding.

III. Safety issues

A. What are the major safety issues associated with DG interconnection?

PG&E: The major concern is an inappropriate and unsafe connection to the distribution system that energizes facilities that would otherwise be de-energized. Such a condition can potentially endanger both the public and utility workers (both telecommunication and energy).

B. What safety characteristics/protective devices are required of the DG machinery itself?

PG&E: The key protective function is to prevent inappropriate backfeed during system fault conditions and islanding conditions. Visible disconnect devices, at the point of common coupling, fault protection devices, and other equipment assist in meeting this goal. The detailed safety requirements for protective equipment that are designed to protect PG&E's system are in Rule 21 and PG&E's interconnection handbook. DG units should also have design characteristics to protect themselves from damage under abnormal conditions.

C. What safety characteristics/protective devices are required for the interconnection device? Is there a need for a disconnect switch in every instance? If not, what criteria triggers the need for a disconnect switch?

PG&E: Current utility safety practices require a visible disconnect device, at the point of common coupling. See PG&E's interconnection handbook for more details. (Please contact PG&E's Chris Tufon at (415) 973-4212 to request a copy).

D. What installation testing procedures should be required? Is there a need for periodic retesting? If so, how often and by whom?

PG&E: Installation testing procedures, referred to as commissioning, are essential to ensure that interconnection standards work properly. Such commissioning by the utilities allows for checking of all appropriate interconnection equipment, DG unit operational characteristics, protection equipment installations and settings, and assessing how the DG unit will be utilized. PG&E's interconnection rules already require periodic retesting and PG&E supports continuing to require that DG owners test

units of substantial size to insure that the unit and the interconnection equipment is operating within its tolerance specifications. In addition, the utility should retain the right to inspect interconnected facilities to ensure that the equipment is functioning properly.

IV. Feasibility of type testing

A. Should type testing be incorporated into the interim standards development process? If so, what factors should be considered in the development of standardized testing processes for various DG types?

PG&E: Type testing should be considered for incorporation into the interconnection standards. PG&E recognizes that DG manufacturers and vendors have a keen interest in type testing requirements as the specifications will impact their design and manufacturing processes.

B. What entity(ies) should certify the equipment? Should self-certification by the equipment manufacturers be allowed?

PG&E: Certification of DG equipment should be handled solely by accredited, independent third party testing laboratory entities. Testing by national entities (e.g., UL) can be desirable as these manufacturers realize cost efficiencies in minimizing the number of certifications required. Self-certification by equipment manufacturers is also appropriate if the factory testing is observed, monitored, and approved by a third party testing laboratory.

V. Information and training to be provided to government agencies

A. What information and training should be provided to fire departments and emergency response personnel?

PG&E: Fire departments and emergency response personnel (PG&E presumes the question is focusing on non-utility personnel) should receive information on all DG units and interconnections from DG owners as required by applicable laws, regulation and safety considerations. PG&E recommends that the CEC and CPUC solicit comments from the appropriate agencies. Utilities or ratepayers should not be required to fund, develop or implement DG-related information or training programs for fire departments and non-utility emergency response personnel. Of course, during emergencies PG&E will cooperate with fire departments and emergency response personnel by sharing critical DG information in PG&E's possession.

B. What information and training should be provided to local building officials?

PG&E: Local building officials should receive information on DG units and interconnections from DG owners as required by applicable laws and regulation. PG&E recommends that the CEC and CPUC solicit comments from the appropriate agencies. Additionally, the utilities or ratepayers should not be required to fund, develop or implement DG-related information or training programs for local building officials.

C. What information should be provided to air quality districts?

PG&E: Air quality districts should receive information on DG installations from DG owners as required by applicable laws and regulation. PG&E recommends that the CEC and CPUC solicit comments from the air quality districts as appropriate.

D. What information should be provided to the CEC under its generator data regulations? (e.g., fuel type, capacity rating, location, etc.)

PG&E: The CEC is in the process of updating its Generator Reporting Requirements (See Report on Generator & Consumer Data Reporting Requirements, November 1999). In general, the CEC proposes, and PG&E supports, having the reporting requirements rest with the generator, not the utility, and the CEC has proposed collecting a list of characteristics from the owners of 1 to 10 MW size generators (location; nameplate, dependable and thermal capacity; heat rate; installation and expected retirement date). However, the CEC's current proposal suggests that the utilities should still collect and report capacity data on all interconnected generators, increasing the requirement from all those above 10 MW to all generators, regardless of size. In reality, PG&E believes that maintaining and filing this report is likely to be burdensome, and will be working with the CEC to lessen the reporting requirements as the CEC develops new regulations.

VI. CPUC Rule 21 changes

A. What changes are needed to Rule 21, (e.g., the elimination of qualifying facility (QF) distinctions?). Are complementary changes to other rules required?

PG&E: The proposed changes to Rule 21 filed recently by PG&E (Advice Letter 1909-E-A, which revised the applicability section of Advice Letter 1909-E) should be adopted. Additional changes to Rule 21 should await the outcome of this OIR and the CPUC's final adoption of DG interconnection standards.

B. What education and training efforts are required in order to process interconnection applications, should they occur in significant numbers?

PG&E: PG&E does not fully understand this question. The utilities are responsible for providing internal training and education to utility personnel who are involved with interconnections. The cost of providing this training will increase with greater numbers of DG. The costs of the interconnection process should be borne by the DG owners causing those costs, and not by the utilities or their ratepayers.

VII. Advanced communications and metering to facilitate dispatch or scheduling

A. What are the major issues surrounding DG-UDC communications and metering? To what extent can experience with the QF industry provide a useful framework?

PG&E: The major issues surrounding DG communications and metering are still emerging. PG&E recommends monitoring the IEEE, New York, and Texas efforts to gain insights into these issues as they develop. With respect to past experience, from a utility perspective, qualifying facility (QF) and DG units are similar to the extent that they both potentially provide power back onto the distribution system. Thus the experience with QFs may prove a useful starting point to set standards for DG metering and communication.

B. What protocols are needed to govern the dispatch of DG facilities?

PG&E: Assuming that dispatch refers to direct utility control of DG facilities for safety and reliability purposes, the utilities' interconnection rules and related interconnection guideline handbooks contain protocols applicable to larger-scale DG facilities (currently greater than 10 MW). Future protocols must continue to reflect these needs plus any additional DG dispatching requirements. These would include possible additional metering, monitoring and communications systems.

C. What type of hardware or functional requirements should be required?

PG&E: Please see PG&E's interconnection handbook for current requirements. Additional requirements need to be developed in these workshops.

D. Do larger-sized distributed generation facilities need ISO dispatchability?

PG&E: Potential dispatch and control by the ISO of certain generation facilities on the distribution system is governed by the ISO tariff. See ISO Tariff, Section 5.1.4.

E. Could ancillary functions be accomplished without utility distribution company dispatch?

PG&E: Assuming ancillary functions refers to DG-supplied services in support of the distribution system, those services would need to be contracted, controlled, and dispatched by the utility.

VIII. Contractual issues surrounding interconnection rules

A. To what extent can interconnection agreements be standardized? In what respects must they be customized?

PG&E: PG&E believes that it is possible to develop standardized interconnection agreements based on unit size and/or technology. In this respect, agreements regarding interconnecting smaller DG units could ultimately be significantly less complex than those for larger units.

B. Are there any liability requirements to be included in the agreements? What is the current situation and what is the insurance industry's position?

PG&E: Current agreements address indemnity and liability during the construction and operation of the DG units. Responsibility for any accidents and damage caused by the DG unit should be placed on the developer or operator of the DG, not the utility. The DG owner and/or operator should be required to maintain adequate insurance coverages to protect against potential liability. The kinds of coverages and appropriate limits can be based on insurance industry standard forms and practices.

C. How can non-discriminatory implementation of the rules be maintained and enforced?

PG&E: As with the current interconnection requirements, any interim standards would be adopted via CPUC order and tariff changes for CPUC regulated utilities. In order to enforce uniform DG standards and practices throughout California these standards would have to be adopted on a state-wide basis, probably through legislation, to apply to all public agency utilities (e.g., municipalities, special districts, and irrigation districts that provide electric services) as well as CPUC-regulated utilities.

IX. Procedural

A. What is the best approach to develop standards in this proceeding?

PG&E: The following principles should govern the conduct of this workshop to ensure a successful and timely result:

- *Establish clear rules for participation and voting.* This is critical to success. PG&E recommends as a model applicable parts of the rules adopted by the CPUC's Permanent Standards Working Group (PSWG) (attached). These rules would apply to both the full workshop and to any subgroups formed.
- *Adopt a proven workshop report format.* The Committee should adopt a workshop report format suitable for treatment of a highly technical subject such as DG interconnection standards. PG&E recommends the PSWG report format, i.e., issue, summary of discussion, recommendation, alternate recommendations, and technical appendix with detailed vote record.
- *Set reasonable size limit first.* After procedural rules are set, the Committee should set a reasonable size limit for DG units to be considered. PG&E recommends that less than 10 MW and believes that the Committee should seriously consider a lower size cut-off. The Committee should then subdivide the standards by size and technology differences, since interconnection rules for smaller size units can be standardized more easily.
- *Prioritize and establish a clear issue list.* Once the size limit has been set, the Committee should determine what the short term needs are for the utilities and DG market, and focus its efforts there. Once the short-term focus has been determined, the workshop participants should establish a list of issues and sub-issues to be addressed and tasks to be accomplished. This list will set the agenda and help with the formation of sub-groups.
- *Build on existing standards.* The Committee should review/understand the current procedures that the California utilities have and use them as

the starting point for developing new standards and also assess the applicability of other states' interconnection initiatives in California.

- Utilize subgroups. Subgroups or working groups should be formed after all of the issues are clearly identified and subdivided. The subgroups should be given clear instructions on what they should make recommendations on and be required to follow the participation and voting rules of the whole workshop group.
- Aim for consensus decision making. While PG&E supports the 2/3 majority approach for a workshop recommendation (see attached PSWG rules) consensus on issues (or near consensus) should be the goal of the workshop. For issues that are highly contentious and on which significant divisions exist, hearings may be appropriate.

B. Should working groups be formed? If so, how many and how should the work be divided among several working groups?

PG&E: See response to previous question.

C. How long should it take to develop standards based on the work of other states?

PG&E: As mentioned earlier, PG&E understands that Texas and New York, with lower size limits and fewer issues, have taken over a year to make recommendations and their rules are still not finalized. It seems unlikely therefore that this workshop could produce a comprehensive recommendation in less than 6 to 12 months, assuming that the workshops are focused and limited to distribution-level standards for DG units under 10MW. However, if additional time is needed to resolve issues, then that time should be provided.

D. Can the schedule for interconnection rules adopted in CPUC R.99-10-025 be satisfied? What process of oversight and facilitation is appropriate to ensure that the schedule is satisfied?

PG&E: PG&E is doubtful that all the issues mentioned in the CPUC OIR (which go beyond interconnection standards) can be resolved in one year. For a proposed process to expedite this workshop, see answer to IX.A above.

E. If a working group process cannot provide consensus in the time available, what formal procedures should the Siting Committee employ to provide an opportunity for consideration?

PG&E: The CEC and CPUC should assess whether additional time is needed to reach consensus, and if it is, then provide the additional time. If parties can not reach consensus, then formal hearings at the CPUC should be considered.

ATTACHMENT

Voting Rules and Membership from Permanent Standards for Metering and Meter Data Used In Direct Access, submitted to the California Public Utilities Commission by the Permanent Standards Working Group, July 29, 1998 in Docket Nos. R.94-04-031 and I.94-04-032.

Rule #1 - A quorum consists of a minimum of 50% of the total qualified voting members.

Rule #2 - Meeting attendees may speak to the group only when recognized by the facilitator. Side discussions will not be allowed. Sarcasm is not permitted and is subject to censure.

Rule #3 - Final recommendations to the CPUC will be decided by a two-thirds majority vote of the qualified voting membership. The final report will include a list of everyone who voted and will include any submitted minority reports. The word consensus will not be used.

Rule #4 - There will be a single vote for each entity.

Rule #5 - To maintain voting membership, an entity must have representatives at two of the last three meetings. The three meetings will include the current or most recent meeting.

Rule #6 - Membership is open to stakeholders and interested parties (firms or entities, not individuals) defined as manufacturers, government entities, trade organizations, consumer advocacy groups, consultants, utilities, employee organizations and ESPs, MDMAs, UDCs, MSPs. Eligibility for membership is subject to challenges at the PSWG meeting. Consultants can vote only if representing an entity.

Rule #7 - To accommodate parties' desires, a simple majority of parties in attendance is required to approve modification of meeting dates or locations, or other minor issues. These issues are called motions of convenience.

Rule #8 - The four subgroups will have the same voting and membership rules as the PSWG Plenary.

Rule #9 - A two-thirds majority of qualified voting members is required to change Procedures or Voting Rules.

Rule #10 - Proxies are not permitted for non attendees of meetings. However a proxy is permitted for a voting member who attends a meeting, in the event that the member s absence is temporary from that meeting. Such proxies will be submitted to the chair in writing, designating the person who is to vote on behalf of the qualified member exercising the proxy privilege.

Rule #11 - A minimum notification of 14 calendar days in advance is required for meeting notifications that will include meeting location, meeting dates, and how to contact the host. Notification will consist of either posting the meeting announcement to the ORA WEB page or to the E-Mail exploder.
(pswg@dra1.cpuc.ca.gov)

Rule #12 - A minimum notification of 7 calendar days in advance is required for advance meeting agendas. Agendas will include items that are to be voted on. Any agenda is subject to the approval and changes of the membership at the meeting. Notification will consist of either posting the meeting agenda to the ORA WEB page or to the E-Mail exploder. (pswg@dra.1.cpuc.ca.gov)

Rule #13 - The Roberts Rules of Order will only be utilized at the facilitator s discretion for handling difficult, or contentious issues. If conflicts occur between these rules and Roberts Rules of Order, these rules will prevail.

Rule #14 - When voting, the qualified members may vote Yes, No, or Abstain. Providing comments by reasons, by the entity voting, is optional. A written minority report or reasons for any vote may be included with the majority report.

Rule #15 - When calculating the two thirds majority, abstain votes will not be included (this takes precedence over eligible voting membership in rule #3.)